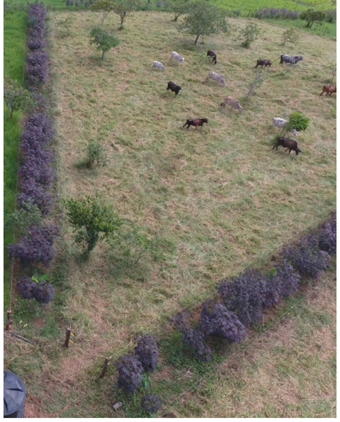
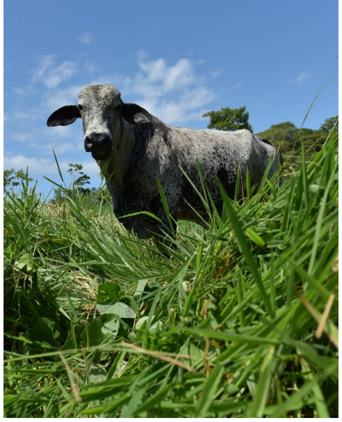
Alliance


POLICY BRIEF No. 60

BIOSMART

Agri-environmental policy, silvopastoral systems, biodiversity, and climate change

BIOSMART[1] is a 3-year interdisciplinary and international project focused on studying the implementation of silvopastoral systems (SPS)[2] and other agri-environmental schemes in the Colombian Amazon for the benefit of society, the environment, and the local economy. These schemes include the Sustainable Amazonian Landscapes project led by CIAT.[3] Our methods include semi-structured interviews, telephone surveys, focus groups, risk-perception games, land-use change modeling, and ecological fieldwork. Our aims are to improve understanding of these systems to support sustainable development goals around eradication of poverty, boosting rural development, achieving net-zero carbon farming, and conserving forests and biodiversity.

Policy recommendations

- Active participation from farmers is essential to define problems and co-design long-lasting solutions that improve living standards and benefit the environment.
- Environmental deterioration needs to be understood as a result of complex historical, socioeconomic, and political problems and not only as a result of individual agricultural practices.
- Project design and implementation must build trust, avoid perpetuating inequalities, and be tailored to the wide variety of livelihoods in the region, and not always focus on increasing agricultural productivity.
- Promoting a variety of habitats on farms, including SPS, can increase biodiversity; however, as forests contain a unique community of plant and animal species, it is imperative that forests be protected.
- In areas currently dedicated to livestock and dairy, investing in a transition to more sustainable practices such as SPS could slow the rate of deforestation and help achieve Colombia's greenhouse gas (GHG) emissions reduction targets for 2030.
- SPS can be more intensive, allowing farmers to maintain or increase animal stocking density while allowing the remnant forests on their land to be protected and restored to improve carbon sequestration and support biodiversity.

1 https://www.biosmartamazonia.org @BioSmart_Amazon.

2 There are different kinds of SPS. Biosmart works with SPS where traditional grazing areas, which were created after clearing forests, were planted with *Brachiaria* forage grasses and lines of trees. Practices such as animal rotation among paddocks were adopted and an area of forest was conserved and allowed to naturally regenerate.

3 Sustainable Amazonian Landscapes is supported by the International Climate Initiative (IKI), https://amazonlandscapes.org

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Our findings

On the implementation of agri-environmental projects

1 How projects define the problem

The Amazon and the environment are often understood as simply an ecosystem and a series of biophysical indicators. In contrast, we found that the Amazon is a territory, a socio-ecology where nature and communities co-exist in a relationship of mutual interdependence. We found that agri-environmental projects often understand deforestation and environmental deterioration as essentially technical challenges. From this perspective, the problem is that inhabitants are "ignorant." This leads to projects focused only on changing people's mentality and farming practices by offering material or monetary short-term incentives to achieve ecological goals.

We found that farmers are knowledgeable and care about their environment. Deforestation and environmental deterioration are historical and complex problems related to wider conflicts over the land and to policies and development models based on inequality and an extractivist relationship with nature. An interdisciplinary approach to this type of problem is necessary. Therefore, beyond being technical and educational, agri-environmental schemes require a context of rural and development policies that give them long-term capacity to transform the living conditions of both people and nature.

2 How projects understand participation

We found that projects often conceive of participation as passive. In contrast, farmers value projects that allow their genuine, dignified, and meaningful participation from the beginning, that is, from the diagnosis of the problem to the design and implementation of solutions. Projects that allow autonomy and flexibility and recognize farmers' knowledge have a greater probability of success, as do projects that provide long-term technical support and assistance as well as technical training.

3 How projects explain ineffectivenes

Project implementers referred to a "culture of assistentialism" among farmers to explain the ineffectiveness of some projects. We found that this expression negatively judges the expectation of support and fulfilment from the Colombian state as a social state of law and of its obligation to protect the country's cultural and natural wealth. We found no evidence of such a culture of assistentialism among farmers. Likewise, we found no evidence for other potential explanations, such as that farmers are lazy or want everything for free. Our research indicates that farmers want to work hard and are willing to contribute time and resources to participate in agri-environmental projects.

4 Unintended consequences

i. **Trust.** We found that projects often focus on short-term impact indicators such as number of materials distributed. Evidently, it is harder to offer long-term commitment to improving living conditions, but we found that projects with a "tick box" approach or that make promises that are not fulfilled have undermined trust. When asked why they had decided not to participate in a project, most respondents mentioned issues of trust. Motivation has also been undermined by projects in which participation seems to be politicized and favors the largest, wealthiest, or best-connected farmers.

ii. **Inequalities.** The implementation of projects sometimes reproduces social, economic, or gender inequalities, or creates in the farmers a feeling of being taken advantage of. All work must start with and maintain dignified, fair, and respectful treatment.

iii. **Inclusivity.** The predominance of agri-environmental projects linked to increasing agricultural productivity means that initiatives reach only rural households that "produce," leaving out of project scope those who do not work their land and prefer to conserve it. People who want to dedicate themselves to caring for the forest complained of not receiving help.

On forests, biodiversity, and silvopastoral systems

5 Forests and biodiversity

Forests support unique communities of wildlife, including invertebrates (spiders and insects) and plants, and are irreplaceable for enhancing and conserving such biodiversity.

6

The deforestation rate is increasing in Caquetá. A total of 6,883 km^2 of forest were lost in Caquetá from 2000 to 2020, equivalent to 8.5% of the region's total forest-covered land. The average annual deforestation rate during that period was 0.46%. During the past 5 years, this increased to an annual average of 0.69%, indicating that the rate of deforestation in Caquetá is far from declining. Using a regression model based on the accumulative forest lost over the past 20 years, we estimate that Caquetá could lose another 4,865 km^2 of forest in the next decade, although this scenario could become worse if the rate of deforestation keeps increasing.

7 Suitability for SPS

Our analysis shows that most of the deforested land in Caquetá has high potential for agroforestry, with 92% of the area suitable for agroforestry systems, of which 27% is suitable for SPS.

8 SPS support biodiversity

i. Invertebrate communities in SPS are more similar to those found in forests than those in traditional pastures. This means that SPS may be able to support invertebrates found in forests, thus allowing these forest species to persist in cattle production landscapes.

ii. Forests contribute the most to the plant diversity of Caquetá. We found a total of 912 native tree species in the forests sampled. On our study farms, trees in the forest account for 75% of the total plant diversity, trees in the pasture for 10%, and pasture herbaceous plants for 15%.

iii. Further, SPS do not diminish the native plant diversity of pastures. Previous research has shown that *Brachiaria* forage cultivars (*Urochloa* spp.) have properties that may stop other plants from growing near them. We did not find this, as the total number of native plant species across our study farms was higher in SPS (72 species) than in traditional pastures (62).

9 SPS and ecological functions

i. Our data indicate that fewer herbivorous pests are found in SPS than in traditional pastures. On average, across the farms we surveyed, we collected almost twice as many (a 95% increase) of these insects (called Hemipterans) in traditional pastures than in SPS. This may indicate that there could be greater biological control in SPS by invertebrate predators such as spiders, which feed on other invertebrates. However, additional analysis is needed to confirm this hypothesis.

ii. In SPS, 25% of the planted tree species were from the legume family. These trees have the potential to increase soil fertility by fixing nitrogen from the air into the soil, which may help increase the productivity of the livestock.

iii. The height of the forage *Brachiaria* grasses in SPS was more than twice that of native grass in traditional pastures; this higher yield contributes to the increased productivity of SPS compared with traditional pastures.

On silvopastoral systems, forest conservation, and climate change

10 Conservation and CO_2 reduction targets

Conserving the forest and restoring natural areas are imperative to be able to meet Colombia's ambitious commitment for 2030 GHG reductions. Under the current deforestation scenario, the carbon emissions linked to forest loss will prevent Colombia from reaching its emissions goal. We predict that 466.6 million tons of CO_2 equivalent could be emitted in the next 10 years because of deforestation to make way for agricultural pastures, equivalent to 28% of the country's cross-sector emissions budget for 2030.

One way to decrease CO_2 in the atmosphere and at the same time maintain and enhance biodiversity is to protect current forests and regenerate and plant new forests.

11 **SPS, forests, and CO_2 sequestration**

SPS can sequester more carbon than traditional pastures, which allows higher stocking densities (from 1.25 to 3.75 times higher than with pasture), with an overall 1.8 times lower GHG emissions from cattle. However, primary forest plots are 66.5 times more effective at storing carbon than SPS. Regenerated forests sequester from 27 to 164 times more CO_2 per hectare per year than SPS.

12 **SPS and CO_2 reduction targets**

Our research shows that deforested areas have a high potential to transition from extensive agriculture to more sustainable practices, including SPS. Since many of these areas are next to forest remnants in Caquetá, adopting more sustainable agriculture, coupled with farmers' agreements to conserve remaining forests, would allow the protection of primary forest and decrease our prediction of deforestation for the next 10 years. Sustainable agriculture alone is insufficient to diminish deforestation.

If 75% of the suitable existing pasture land in Caquetá were converted to SPS, this would save up to 7% of Colombia's emissions budget for 2030. In addition, and depending on the stock density achieved and together with a commitment to conserve remnant forests, this would mean that the predicted loss of primary forest could be decreased by up to 25%, which would support the Colombian government's pathway to net zero.

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Partners

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